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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,280	06/28/2004	Hillegonda Bakker	TS6320uS	9209

23632 7590 01/30/2007  
SHELL OIL COMPANY  
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EXAMINER
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PETTITT, JOHN F

ART UNIT	PAPER NUMBER
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3744

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/30/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/500,280

Applicant(s)

BAKKER ET AL.

Examiner

John Pettitt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06/28/2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 12 and 16-19 is/are rejected.
- 7) ☒ Claim(s) 9-11 and 13-15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>06/28/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Objections*

**Claims 1-19** are objected to because of the following informalities:

**In regard to claim 1**, the recitation "*a plurality of primary gas cooling device each of which*" (line 2) should read --a plurality of primary gas cooling devices each of which---.

The recitation "*outlet*" (line 6) should read--outlets--.

The recitation "*wherein the plurality of a liquefied and/or solidified condensables enriched fluid outlets*" (line 17-18) --wherein the plurality of liquefied and/or solidified condensables enriched fluid outlets--.

The recitation "*which conduits*" (line 19-20) should read --which outlets--.

**In regard to claim 5**, The recitation "*device*" (line 3) should read --devices--.

**In regard to claim 6**, the recitation "*device*" (line 3) should read --devices--.

The recitation "*is*" (line 5) should read--in--.

**In regard to claim 7**, the recitation "*the second stage separation vessel*" (lines 2-3) should read --the secondary separation vessel--.

**In regard to claim 9**, the recitation "*on one or components*" (lines 2-3) should read --on one or more components--.

**In regard to claim 10**, the recitation "*the vortex breaker*" (lines 3-4) lacks antecedent basis. It is assumed to read --a vortex breaker--.

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In regard to claim 17, the recitation "*injecting the fluid mixture into a primary gas cooling devices*" (line 3) should read -- injecting the fluid mixture into a plurality of primary gas cooling devices --.

The recitation "*and in which a stream*" (lines 6-7) should read --and in each primary gas cooling device a stream--.

The recitation "*wherein a plurality of secondary fluid injection conduits of a plurality of primary gas cooling devices are connected*" (lines 19-20) should read -- wherein the plurality of secondary fluid outlets are connected --.

The recitation "*conduits*" (lines 22) should read --outlets--.

In regard to claim 18, the recitation "*a natural gas stream which is cooled in gas cooling devices*" (lines 1-2) should read -- a natural gas stream which is cooled in the gas cooling devices --.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-7, 12, 16-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Atkinson (US 2,683,972) in view of Engle (US 3,259,145).

In regard to claim 1, Atkinson teaches an apparatus comprising a primary gas cooling device (13-vortex tube) which has a liquefied and/or solidified condensables

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enriched fluid outlet (14); a secondary fluid separation vessel (11) having a tubular section of which a central axis has a substantially vertical orientation, which vessel is connected to said condensables enriched fluid outlet (14) of said primary gas cooling device (13), wherein during normal operation of the vessel the condensables enriched fluid is induced to swirl around the central axis of the tubular section of the vessel (as with the high speed at which the fluid will enter the vessel (11) there will be swirling fluid which will be forced to swirl around the central axis of the tubular section by the walls of the vessel (11)) such that a tertiary stream (interpreted as a third stream) of liquefied and/or solidified condensables is induced by gravity and centrifugal forces to swirl in downward direction alongside the inner surface of the tubular section of the vessel into a liquid collecting tank (either 12, 29, or both) at or near the bottom of the vessel, which tank is provided with a heater (18) for heating the tertiary mixture to reduce the amount of solidified condensables and with one or more outlets (33, 32) for discharging the tertiary mixture from the tank; the outlet also injects in use condensables enriched fluid in an at least partially tangential direction (partially tangential being interpreted to mean in any direction not parallel to the radius of the tubular section) into the interior of the secondary separation vessel.

Atkinson does not teach a plurality of primary gas cooling devices nor that the outlets of such are connected at regular circumferential intervals to the tubular section of the secondary separation vessel. However, as is commonly known in the art and taught by Engle (column 1, lines 47-60) a vortex tube provides colder temperatures as the flow rate through the cold outlet is *decreased*, therefore, by adding additional vortex

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tubes (in the same manner as the one vortex tube is provided) in parallel to the secondary separation vessel (11) of Atkinson the flow rate through each of the individual vortex tubes would be decreased and the condensation temperature would be lowered or alternatively for a set condensation temperature a greater volume of condensables would be liquefied increasing the productivity of the system. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify separation system of Atkinson with a plurality of vortex tubes as taught by Engle to increase the capacity of the system to improve the processing capacity of the system.

**In regard to claim 2**, Atkinson teaches that the liquid collecting tank (12, 29) comprises an upper liquid outlet (33) and a lower liquid outlet (32).

**In regard to claim 3**, Atkinson teaches that the separation vessel (11) is equipped with a tertiary gas outlet conduit (containing stream 21) having an inlet (see Fig. 1) which is located at or near the central axis of the tubular section.

**In regard to claim 4**, Atkinson teaches that the separation vessel (11) has a dome shape which is mounted on top of the tubular section (see Fig. 1) and the tertiary gas outlet conduit is arranged substantially co-axial to the central axis of the tubular section and passes through said top.

**In regard to claim 5**, see claim 1.

**In regard to claim 6**, the combination discussed above for claim 1 results in the plurality of primary cooling device outlets to inject in use condensables enriched fluid in

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an at least partially tangential and partially downward direction into the interior of the secondary separation vessel (11).

**In regard to claim 7**, Atkinson teaches that the collecting tank (12) is formed by a cup-shaped tubular lower portion of the secondary separation vessel (11) which is substantially co-axial to the central axis and has a larger internal width than the upper portion of the vessel (11).

**In regard to claim 12**, Atkinson teaches that the liquid collecting tank (12) is provided with a grid of heating tubes that are designed to heat the liquid and solid fluid mixture in the tank to a temperature of at least 15 degrees Celsius (column 4, lines 1-12).

**In regard to claim 16**, the combination discussed for claim 1 would result in each of the gas cooling devices having a choke (15; choke is interpreted as orifice or restriction).

**In regard to claim 17**, see remarks for claim 1.

**In regard to claim 18**, for the combination discussed for claim 1 Atkinson teaches that the fluid mixture is a natural gas stream which is cooled in the gas cooling devices comprising one or more primary cyclonic inertia separators (13) to a temperature below 0 degrees Celsius (equivalent to 32 degrees Fahrenheit; column 3, line 70) thereby condensing and/or solidifying aqueous and hydrocarbon condensates and gas hydrates and the tertiary fluid mixture comprises water, ice, hydrocarbon condensates, and gas hydrates and is heated in the tertiary collection tank to a temperature above 15 degrees Celsius (column 4, lines 1-12) and from which tank low

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density hydrocarbon condensates are discharged through an upper liquid outlet (33) and high density aqueous components are discharged through a lower liquid outlet (32).

**In regard to claim 19**, for the combination discussed for claim 17, Atkinson teaches that liquefied and/or solidified components are separated from the gaseous components by centrifugal force in the primary gas cooling devices (column 2, lines 45-50).

**Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Atkinson (US 2,683,972) in view of Engle (US 3,259,145) and further in view of Coggins et al. (US 4,208,196). Atkinson and Engle teach all of the limitations of claim 1 except that a vortex breaker (interpreted as any structure which dissipates the kinetic energy of the fluid after a vortex has been created) be arranged in the interior of the secondary separation vessel between the lower end of the tubular section and the liquid collecting tank. However, Coggins et al. teach that providing a slat structure between a spinner and a liquid collection tank is well known in the art for the purpose of enhancing the liquefaction efficiency of oil well separators. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to combine the system discussed for claim 1 with a slat structure as taught by Coggins et al. to further improve the liquefaction efficiency (so that more of the desired hydrocarbon content of the fluid entering the system may be recovered).



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***Allowable Subject Matter***

**Claims 9-11 and 13-15** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Pettitt whose telephone number is 571-272-0771. The examiner can normally be reached on M-F 8a-4p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JFP III  
December 21, 2006

  
CHERYL TYLER  
SUPERVISORY PATENT EXAMINER